1.4 Water Quality Monitoring

1.4.1 Introduction

Since the authorization of the first storm water permit by the San Diego Regional Water Quality Control Board (Regional Board) in 1990, the City of San Diego (City) participated in and managed many elements of the twenty-three member copermittee regional water monitoring program, including toxic hot spots evaluation, wet weather water quality monitoring, bioassays for toxicity, benthic macro-invertebrate bioassessment, and special studies in San Diego and Mission Bays and several rivers, creeks, and lagoons. Under coordination with the Regional Board and with assistance from professional environmental consulting firms, the City obtained a baseline dataset that illustrates the characteristics, quality, and effects of storm water related urban runoff on creeks and bays. In addition, the City developed and implemented (independent of other municipalities and copermittees) a dry weather monitoring program to characterize flows in conveyance systems throughout the City and a Coastal Storm Drain Monitoring Program in Mission Bay and along Ocean Beach, Pacific Beach, and La Jolla to monitor the concentration of bacteria in the surfzone near discharge points.

The goal of the water quality monitoring program element is to perform continuous and ongoing storm water conveyance system monitoring and water sampling within the City's six watersheds to better characterize urban runoff into and from the City of San Diego municipal storm water conveyance system with an emphasis on the detection of illicit discharges. The City's water quality monitoring programs incorporate knowledge of the latest environmental mapping and laboratory technologies, past water monitoring data, historical water quality problem areas, the goal and objectives of the City, and the requirements of the Municipal Storm Water Permit.

Staff will utilize the data and information collected from previous years monitoring efforts in addition to the data and information collected under the new water quality monitoring programs to determine if amendments and changes are necessary to better monitor and abate pollution. In addition, the information will be used by the:

1) IC/ID team to track and identify sources of polluted discharges;
2) Enforcement and code compliance team to document and develop enforcement and compliance cases
3) Storm water administrative staff and supervisors to determine the positive effects of illicit discharge and illegal connection abatement efforts;

4) Directors and watershed managers to make more educated planning and policy decisions;
5) Public information officers to develop more directed and effective educational campaigns;
6) Management analysts to evaluate and pursue potential grant opportunities.

Table 1.4-1 below summarizes and outlines specific program requirements the City must incorporate into its storm water management program and duties the City must perform to comply with the Water Monitoring Sections of the Municipal Permit.

Table 1.4-1 Permit Requirements – Water Quality Monitoring.

Section	***Requirement (Summary)***	***Permit Section***
1.4.1	Implement Receiving Waters Monitoring and Reporting Program.	P
1.4.2	Participate in a countywide receiving water monitoring program.	Attachment B.II
1.4.2	Conduct dry weather analytical monitoring of outfalls within its jurisdiction to detect illicit discharges and storm drain connections (see Attachment E of the Municipal Permit).	F.5.b
1.4.2	Require industry to conduct a monitoring program for runoff from each high threat to water quality industrial site.	F.3.b. (5)
1.4.2	Conduct follow-up investigations as necessary to track illicit discharges and connections.	B.5
1.4.2	Annual watershed water quality monitoring that satisfies the watershed monitoring requirements in Attachment B of the Municipal Permit.	J.2.b
1.4.3	Develop a budget for storm water expenditures for each fiscal year covered by the Municipal Permit.	F.8
1.4.4	Document activities for Jurisdictional Urban Runoff Management Program Annual Report.	I

The objectives of the water quality monitoring program component are to:

- Assist in the coordination of and participate in the implementation of the countywide receiving waters monitoring program.
- Develop and implement a prescriptive and adaptive dry weather monitoring program that identifies potential illicit discharges and characterizes urban runoff flow.
- Obtain monitoring data of runoff from high priority industrial sites.
- Develop response plans, follow-up measures, and enforcement referral procedures to track, identify, and abate discharges that cause exceedences in monitoring samples.
- Utilize long-term water monitoring data to determine the effectiveness of active pollution abatement and pollutant source control.

- Develop and maintain a monitoring database for documentation and tracking of water quality data

1.4.2 Activities

Coastal Water Quality Monitoring

1. Coastal Monitoring1996-1999:

The Coastal Monitoring Program started in October 1996. Storm water staff reviewed storm water conveyance facility maps and performed field surveys to identify and determine the City's coastal outfall locations and sampling priorities. The coastal program testing was performed initially at thirteen coastal drains for total and fecal coliform bacteria.

The coastal monitoring program performed between 1996 and 1998 established a 2-year baseline dataset for bacterial levels at individual coastal storm drain outfalls. When total and fecal coliform bacterial testing indicated consistently high bacteria counts or when the TC/FC ratio dropped below 10:1, Storm Water Program staff tested upstream locations at various branches of the storm water conveyance systems while Metro Wastewater televised and inspected the conveyance system for illicit connections.

2. Coastal Monitoring 2001-2006:

The City will perform the following activities during the implementation of the required Coastal Monitoring Program:

1) Evaluate of the impacts of storm water conveyance facility discharges on the recreational beneficial uses in coastal receiving waters.
2) Determine if bacteriological water quality improves or declines seasonally and over time, and refer chronic exceedence locations to the IC/ID team for investigation and abatement.
3) Develop a coastal water monitoring database.

The proposed coastal monitoring program will require that a paired sample be collected monthly 1) near the coastal storm water conveyance outfall and 2) 75 feet north or south of the mixing zone depending upon swell direction at all priority flowing outfalls. Storm Water Program staff will consider the following criteria when classifying and prioritizing coastal outfalls: historical beach postings, flows, drainage area size and land use, accessibility, recreational water use, receiving water body sensitivity, and municipal interests. The City will monitor non-priority sites annually although no samples will be collected. Based upon changes in the aforementioned site evaluation criteria, the City may reclassify a pipe's priority.

3. Low Flow Diversion:

The City of San Diego constructed and is currently operating seven coastal interceptor systems known as the Beach Area Low Flow Diversion Project to redirect nuisance flows into the sanitary sewer during periods of dry weather, preventing nuisance runoff from flowing onto the beaches. The interceptor systems eliminate nuisance flows to the beach on most days. The City expects these systems to divert pollutants away from the beaches, preventing future beach closures during dry weather periods.

The project supplements an earlier project, the Mission Bay Sewage Interceptor System (MBSIS), which constructed automated diversion systems around Mission Bay and the San Diego River Channel between the mid-1980's and mid-1990's. More information is contained in the component 1.10 Low Flow Diversion System.

Dry Weather Water Quality Monitoring

1. 1992-2001 Dry Weather Monitoring:

In May of 1992, the City developed a conveyance system and dry weather urban runoff water quality monitoring program that complied with SWRCB Municipal Permit no. 90-42. The City identified major drainage conveyance facilities consisting of storm flood control channels, creeks, and rivers and located a sampling location within a relatively heavily developed land use (i.e. residential, commercial, mixed use). Each year since 1992, the City monitored all 43 locations a minimum of 2 times, occasionally as many as 5 times, each summer through the summer of 2001. Monitoring the sites consisted of water sampling (if flowing), flow measurement, and extensive visual observations. The years of monitoring provided the City with an excellent characterization of the drainage's general flow conditions and the water's physiochemical and bacteriological characteristics. The City reviewed past years dry weather monitoring data and locations and determined that keeping several of the monitoring locations would continue to provide valuable information and data but that the City could gather more valuable information and data by adding additional, relocating, or abandoning many of the existing monitoring locations.

2. 2002-2006 Dry Weather Monitoring:

While the past Dry Weather Monitoring programs monitored several major drainage facilities, creeks, and rivers, the newly developed Dry Weather Monitoring Program will be focused more on monitoring storm water conveyance facility outfalls as they drain into major flood control channels and creeks. This new approach will better characterize and identify sources of pollution, as it focuses on sampling discrete conveyances and unique confluences. City staff developed the new Dry Weather Monitoring program using many of the following tools, data, and monitoring principles, taking into

consideration the departments that would utilize the information for further pollution identification and educational activities:

- Conveyance system bifurcation model to identify strategic sampling locations for IC/ID pollution tracking and abatement.
- Basic and advanced water testing methods for use by lab technicians, biologists, code compliance officers, and other non-storm water field personnel.
- Land use maps (including sensitive environmental resources).
- Watershed boundaries
- Storm water conveyance facility maps.
- 303(d) list for impaired water bodies.
- Historical water quality sampling data.
- High use recreational beaches and bays.
- Inter- and Intradepartmental programs goals and objectives.
- Region-wide benthic invertebrate monitoring data.

The Dry Weather Monitoring program will test for all parameters listed under attachment E of the Municipal Permit utilizing approved methods as listed in section 40 CFR 136. A quality assurance and training program currently being drafted by city staff will ensure that field personnel collect samples appropriately, samples are properly preserved, bottles appropriately labeled, and proper chain of custody procedures followed. The City will utilize the State approved Alvarado Metro Wastewater Laboratory, or other State approved private laboratory, for the analysis of all analytical parameters listed under Attachment E-4c, analytical laboratory analytes. Measurement of parameters listed under Attachment E-4d, field screening analytes, will be performed by the State approved Alvarado Metro Wastewater Laboratory or other State approved private laboratory, or by utilizing a combination of field meters, titrations, colorimetric comparisons, or testing “dip strips” as determined appropriate based on test precision, detection limit, range, cost, and simplicity.

The City will maintain a computer database containing all result from all water testing, field observations, and flow measurements. The computer database will be reviewed frequently for adverse flow conditions, presence or absence of chemical constituents, and to evaluate for and determine trends. If after review of the data staff finds that analytical laboratory or field monitoring results detected concentrations of pollutants that exceed permissible levels as determined by statistical evaluation and established action levels, City staff will follow-up by resampling and/or investigating to determine the source(s) contributing to the exceedence and refer the situation to the IC/ID abatement program.

Industrial Monitoring Program

The City has identified at least 300 major industrial facilities actively registered with the State Water Resources Control Board’s General Industrial Storm Water Permit

Program, per ***Permit No. CAS00001***. As part of the City's Industrial & Commercial Users component found in section 2.5, the City has developed an inventory of industrial facilities using the general industrial permit database, business permits, and other pertinent data. The City will implement a phased approach to prioritize industrial facilities, develop and inventory of industrial facilities, establish discharge prohibitions and minimum storm water BMP's to be implemented at all high priority industrial sites, develop an educational program specific to industrial users, and perform inspections and investigations of industrial facilities. The inspection and investigation of industrial facility discharges will include evaluation of monitoring data collected during prescribed storm water monitoring programs as mandated by ***Permit No. CAS000001***.

Any industrial facilities not subject to the ***General Industrial Storm Water Permit*** and determined to be a high priority will be required to implement a storm water monitoring program following standardized monitoring and sample collection procedures, analytical methods for physiochemical analysis of water samples, and reporting procedures. The City will review data collected by the General Industrial Storm Water Permittees and by City designated high priority industrial sites. City officials can inspect any facility that could affect water quality at any time. The Industrial and Commercial Users component found in section 2.5 provides a more detailed and thorough discussion of storm water pollution prevention activities related to industrial and commercial land uses.

Regional Wet Weather Monitoring

The City of San Diego co-chairs the San Diego County Regional Wet Weather Storm Water Quality Monitoring Program, which necessitates the coordination of 18 cities, the County of San Diego, and the San Diego Unified Port District. For the past eight wet weather seasons, the copermittees performed storm water runoff sampling and analysis as well as focused sediment, pesticide, and receiving water studies in an effort to characterize storm water runoff and assess its quality, effects, and impacts on receiving waters. The regional wet weather monitoring program involves the sampling and analysis of runoff collected during storm events using flow-weighted composite samplers.

Although there may be some variation between the years, the copermittees request analysis for general physiochemical constituents, toxic substances, bacteria, nutrients, sediments, and toxicity. Collectively, the field work, laboratory analysis, and reporting cost the copermittees just over $1,000,000 for the 2001 wet season. Using a formula that takes into consideration population and developed land use, the copermittees determine their fair share and percentage of the total program cost. The City of San Diego's percentage generally remains around _ of the total program cost. From the first wet weather season in 1993 through the current wet season of 2001, the San Diego City's dollar cost share of the program ranged from approximately $320,000 for a total contribution of nearly $2,000,000 over the past eight wet seasons.

Comprehensive annual reports which include future monitoring and sampling recommendations provide the copermittees with a combined prescriptive and adaptive monitoring program perspective that takes into consideration past years findings and current unanswered questions. The copermittees plan to continue monitoring through 2004 when the existing Municipal Permit expires. At that time, the copermittees will determine if amendment or changes need to be made in the existing program to comply with any new permit requirements the copermittees anticipate will arise using a new approach to urban runoff management, the watershed approach.

Toxic Hot Spots Monitoring Program

A 1996 California Bay Protection and Toxic Cleanup Program report identified 5 discrete locations of sediment contamination, toxicity to marine life, and benthic community impairments. The City coordinated with the San Diego Unified Port District and United States Navy in 1999, forming the Toxic Hot Spots Work Group to begin addressing the San Diego Bay toxicity issues. The Toxic Hot Spots Work Group in coordination with the San Diego Regional Water Quality Control Board (Regional Board) and Southern California Coastal Water Research Project (SCCWRP) will develop a comprehensive toxicity study that considers and/or implements a study of drainage systems and patterns, the hydrology and hydraulic influence of landuses, flow weighted composite water samples for several toxic substances and general physiochemical parameters, sediment, and marine organisms and communities.

The City is currently reviewing Sediment data collected during a 1998 study of Chollas Creek. Beginning July 2001, and with the assistance of the San Diego Copermittee Regional Monitoring Program, the second phase of the monitoring activities will begin with a comprehensive upstream sediment bedload characterization on Paleta and Chollas Creek. This sampling program will provide supplemental data to the Toxic Hot Spots Working Group. Based upon the data collected and findings throughout this program, the Toxic Hot Spots Working Group will amend and adapt the sampling program to better characterize the sources of toxicity and mobilization of pollutants.

Total Maximum Daily Loading (TMDL) Development For Impaired Water Bodies

1. Bacteria:

In January 2001, the Mayor established a goal to reduce beach posting and closure days by 50% by 2004. In 2000, there were 2,334 beach posting and closure days at City of San Diego beaches including 1,453 for Mission Bay. To address the Mayor's goal, the Storm Water Program created a work program of various projects (see Table 1.4.2-1) and aggressively pursued funding for those projects. The work program has been reviewed by the Mayor's Clean Water Task Force and is continually being updated. Mission Bay water quality studies which have been funded within the past year are:

Table 1.4.2-1. Water quality monitoring project timelines.

	Project	***Project Timeline***
1	Mission Bay Source Identification Study	Spring 2002 – Spring 2003
2	Mission Bay Water Quality Study	July 2001 – July 2003 (may be extended to July 2004)
3	Mission Bay Dry Water Bacterial Source Testing	Spring 2002 – Fall 2003
4	Mission Bay Human Pathogenic Virus and Epidemiology Study	Spring 2003 – Spring 2005
5	Mission Bay Contaminate Dispersion Study	Spring 2002 – Spring 2003
6	Mission Bay Sediment Research Project	Fall 2001 – Fall 2003

The City employed MEC Analytical Systems, Inc. to analyze and evaluate bacteriological data (Total Coliform, Fecal Coliform, and ***Enterococci***) collected at 20 locations throughout Mission Bay between 1993-2000. The analysis assessed compliance with Assembly Bill 411, identified trends and "hot spots," and compared wet and dry season data. Elevated bacteria levels at several locations within Mission Bay resulted in routine water quality advisory postings and occasionally complete beach closures over the past several years. Between Spring 2002 and Spring 2004, the City will implement a bacteria source identification study in Mission Bay including near confluence of Rose, Tecolote and Cudahy Creek. The Mission Bay Source Identification Study will focus on the following elements:

- Investigate the storm water conveyance system including surface flows and the Mission Bay Sewer Interceptor System Program;
- Document the uses of each area by the public, City employees and wildlife;
- Investigate if the comfort stations in these areas have an impact on water quality;
- Investigate the irrigation cycles to determine their impact on water quality;
- Investigate if the tidal cycles have any influence on water quality; and,
- Investigate the impact of moored boats on water quality.

Once the data has been reviewed and sources identified, the City will implement appropriate BMP's to minimize input from manageable sources, if applicable.

2. Toxicity:

Consistent with the Toxic Hot Spot Monitoring Group, the City will be monitoring for additional toxic chemicals identified in Chollas Creek. The City is planning to implement a monitoring program that will:

- Continue collecting wet weather samples at nine existing locations, and
- Inspect storm water conveyance facilities.

Once the TMDL has been implemented, the City will be required to strictly manage the runoff and discharge of diazinon to Chollas Creek. The City has begun implementing educational BMPs and inventorying large pesticide applicators in the watershed.

Illicit Connection / Illegal Discharge Abatement Program

The City Storm Water Program's Code Compliance Unit developed a procedure to efficiently and effectively investigate alleged violations of the City Storm Water Municipal Code. Code Compliance Officers routinely receive reports of discharges to the storm water conveyance system from residents, municipal employees, and business owners via the Storm Water Hotline. Once a formal complaint is established, Code Compliance Officers begin investigating the alleged discharges within 24 hours.

If, based upon the information provided by the complainant and follow-up investigation by the Code Compliance Officers or field Biologists, there is sufficient evidence to prove that an illegal discharge occurred and a responsible party can be identified, Code Compliance Officers will initiate formal enforcement activities. The enforcement activities are implemented to abate or eliminate the source, conveyance, or activity that contributed to the release or discharge as deemed appropriate based upon the nature of discharge, negligence, and prior history of discharges. Code Enforcement Officers staff may use any combination of the following tools to follow-up, investigate and prepare a formal enforcement case for an illegal discharge.

- Smoke, dye testing
- Storm water conveyance facility maps
- Complainant information
- Analytical monitoring results
- Business license database
- Hazardous materials inventory databases
- Digital and Polaroid pictures
- Visual observations, odors
- Flow: frequency, intensity, duration
- Biological indicators

For a more comprehensive explanation of the City's enforcement procedures, refer to Component 1.3, Enforcement of Storm Water Ordinances.

Ultimately, the abatement of waste discharges, education of the violators, and enforcement activities should significantly reduce the introduction of pollutants into the storm water conveyance system. This reduction in waste discharges to the storm water conveyance facilities should be reflected in the dry weather and coastal outfall monitoring programs as a reduction in the detection and concentration of toxic substance, sediments, bacteria (pathogens) and nutrients.

1.4.3 Phasing

The City may elect to phase specialized monitoring locations in subwatershed areas where the IC/ID, code compliance and public education and information divisions performed focused enforcement, required business to implement structural and non structural BMP, and directed specific educational campaigns. Over time, the data from Dry Weather Monitoring Program and Coastal Water Monitoring Program should provide a quantitative and qualitative evaluation of the pollution abatement, storm water BMP implementation, and education efforts.

Year 1 (July 1, 2001 – June 30, 2002):

- Plan & Implement Dry Weather Monitoring Program
- Plan & Implement Coastal Monitoring Program
- Illicit Connection / Illicit Discharge
- Regional Wet Weather Monitoring Program
- Prepare & submit annual activities report

Year 2 (July 1, 2002 – June 30, 2003):

- Dry Weather Monitoring Program
- Coastal Monitoring Program
- Illicit Connection / Illicit Discharge
- Regional Wet Weather Monitoring Program
- Prepare & submit annual activities report

Year 3 (July 1, 2003 – June 30, 2004):

- Dry Weather Monitoring Program
- Coastal Monitoring Program
- Illicit Connection / Illicit Discharge
- Regional Wet Weather Monitoring Program
- Prepare & submit annual activities report

Year 4 (July 1, 2004 – June 30, 2005):

- Dry Weather Monitoring Program
- Coastal Monitoring Program
- Illicit Connection / Illicit Discharge
- Regional Wet Weather Monitoring Program
- Prepare & submit annual activities report

Year 5 (July 1, 2005 – June 30, 2006):

- Dry Weather Monitoring Program
- Coastal Monitoring Program
- Illicit Connection / Illicit Discharge
- Regional Wet Weather Monitoring Program
- Prepare & submit annual activities report

Actual implementation of the activities listed above is dependent upon identification of funding in future yearly budgets and City Council approval.

1.4.4 Annual Assessment

The following form is representative of the quantitative and qualitative measures that will be tracked by the Storm Water Program regarding the Water Quality Monitoring component in order to prepare the Jurisdictional Urban Runoff Management Program annual assessment. ***These assessment factors and questions are presented for information only; some questions may be modified prior to each annual assessment period, and not all of the factors or questions below may apply to each component's responsible department(s)***. Prior to each fiscal year, a tailored Annual Assessment Form will be distributed to responsible departments, and will include an Excel spreadsheet containing direct and indirect quantitative and qualitative measures similar to the example below. The Storm Water Program will provide a blank copy of the Annual Assessment Form and additional guidance to department management prior to the beginning of each fiscal year. Submission of this report will require department director approval.

Program Assessment Form – Water Quality Monitoring Component

QUANTITATIVE ASSESSMENT:

Activity	Quantity	Units	Comments
Number of dry weather sampling locations monitored		#	
Number of illicit connections eliminated or on a compliance schedule		#	
Number of illegal discharges eliminated or on a compliance schedule		#	
Number of storm water complaints / referrals received		#	

QUALITATIVE ASSESSMENT:

1. Describe the major accomplishments of the Water Quality Monitoring Component over the past year.

2. Summarize the internal and external educational and outreach activities the Water Quality Monitoring component has conducted over the past year.

3. Summarize new activities or improvements to be implemented next year as a result of your self-assessment.

4. Other comments.

FINANCIAL ASSESSMENT:

Estimated annual storm water expenditures:

Personnel Expenditures: _____

Non-personnel Expenditures: _____